# CVEN 345-501 Theory of Structures

**Fall 2017**

**MWF 3:00 – 3:50pm HEB 110**

## Instructor:
- **Name:** Dr. Stephanie Paal
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**Office hours:**
- MWF 1:30 — 3:00pm and by appointment

## TA:
- **Name:** Emily Miller
- **Room:** TBD
- **Help desk hours:** TBD

## Communication:
Questions and discussions are highly encouraged during class period and office hours. Please use e-mail to make appointments and for other communication purposes. Relevant class information, including announcements and assignments, will also be posted on the web. *You are expected to check the announcements at least once every 24hrs during the work-week.*

The main course web site address is:  [http://ecampus.tamu.edu/](http://ecampus.tamu.edu/)

## Text:
*Structural Analysis* by Aslam Kassimali, 5th ed.

## Course Description:
Structural engineering - functions of structure, design loads, reactions and force systems; analysis of statically determinate structures including beams, trusses, and arches; energy methods of determining deflections of structures; influence lines and criteria for moving loads; analysis of statically indeterminate structures including continuous beams and frames.

## Prerequisites:
- **CVEN 302:** Computer Applications in Engineering and Construction – basic knowledge of computing languages (MATLAB); Methods for numerical solution of systems of algebraic equations and (non)linear differential equations, and including evaluation of matrix eigenvalues/eigenvectors.
- **CVEN 305:** Mechanics of Materials – stress/strain (deformation) relationships of elastic bars (axial loading), rods and shafts (torsional loading), beams (flexural loading), combined loading, stability of columns, etc.

Note that all courses that are pre- and co-requisites to the above courses are automatically considered as prerequisites to this course.

If you are unfamiliar with any of these concepts please review the applicable materials at [http://ceresources.weebly.com/](http://ceresources.weebly.com/).

## Important Dates:
- **Monday 28 August**  First Day of Class
- **Monday 02 October**  **Exam 1** (Tentative)
- **Monday 20 November**  **Exam 2** (Tentative)
- **Wednesday 22 November**  No Class
- **Friday 24 November**  No Class
- **Monday 04 December**  Redefined Day – Class meets
- **Tuesday 12 December**  **Final Exam:** 10:30 – 12:30pm
General Course Objectives:

This course focuses on the following major learning objectives:
1. To develop an understanding of the basic principles of structural analysis and be able to explain them.
2. To determine and analyze models of applied loads on structures.
3. To utilize various exact methods of analysis of beams, trusses, and frames to determine the response of both determinate and indeterminate structures.
4. To utilize various approximate methods of analysis of beams, trusses, and frames to determine the response of both determinate and indeterminate structures.
5. To apply the method of virtual work in determining deflections of structures.
6. To develop and utilize influence lines of structures.
7. To evaluate the response of various structural systems (both determinate and indeterminate) under a range of demands, such as applied loads, support motions, and temperature changes.
8. To understand the role of structural analysis within the context of engineering design and decision-making.

ABET Outcomes Addressed:

1. Ability to apply knowledge of basic mathematics through differential equations, science, and engineering to solving civil engineering problems.
2. Ability to formulate and solve civil engineering problems.
3. Understanding of professional and ethical responsibility.
4. Recognition of the need for, and an ability to engage in, life-long learning.
5. Ability to use modern tools, techniques, and computation methods necessary for civil engineering practice.

Grading:

Final grades will be based upon the overall average to be determined as follows:

- In-Class Exercises/Quizzes: 10%
- Homework: 20%
- Mid-Term Exam with higher grade: 25%
- Mid-Term Exam with lower grade: 20%
- Final Exam: 25%
- 100%

where: A: P ≥ 90; B: 90 > P ≥ 80; C: 80 > P ≥ 70; D: 70 > P ≥ 60; F: 60 > P

- I will drop your lowest homework grade IF AND ONLY IF you turn in all assignments.
- I will drop your lowest quiz/in-class exercise grade IF AND ONLY IF you miss no more than one quiz or in-class exercise.

No "deals" will be made at the end of the semester. After the final exam, there is NOTHING you can do to improve your grade, so please don’t ask. If you work hard throughout the entire semester, you will do well.

I do not curve grades in this course. It is theoretically possible for everyone in the class to get an A (or an F). Your performance depends only on how you do, not on how everyone else does. Therefore, it is in your best interest to help your classmates in every legal way possible.

Please note that your papers are GRADED, NOT CORRECTED. Occasionally your paper will be "corrected", noting all errors. At other times they may only be checked for completeness.

You are responsible for keeping all graded work until you receive your final grade.

In-Class Exercises and Quizzes:

Attendance and class participation are required.
In-Class Exercises will be work performed as learning exercises occasionally throughout the semester. These will not be announced beforehand.

Quizzes will be short, announced (during the preceding class period) assessments of your level of understanding, given periodically throughout the semester.

Quizzes and in-class exercises that are given when you are not in class cannot be made up without a documented excused absence. A missed quiz or exercise will be counted as a zero without the documented excused absence.

The reasons absences are considered excused by the university are the following:
1. Participation in an activity appearing on the university authorized activity list
   http://studentactivities.tamu.edu/stuactweb/submainpages/authsponmain.htm
2. Death or major illness in a student’s immediate family
3. Illness of a dependent family member
4. Participation in legal proceedings or administrative procedures that require a student’s presence
5. Injury or Illness that is too severe or contagious for the student to attend class
6. Required participation in military duties
7. Mandatory admission interviews for professional or graduate school which cannot be rescheduled

Note that job interviews are NOT University approved excuses.

If you have a scheduled university excused absence, you must present the excuse before the date of the event and make arrangements to turn in any assignments due on that date by the assigned deadline. In the case where illness or other unplanned catastrophe happens, you are expected to contact the instructor as soon as possible and no later than the second business day after the absence. As provided for in the university rules, injury or illness confirmation will be through a medical confirmation note that must contain the date and time of the illness and medical professional’s confirmation of needed absence. An absence for a non-acute medical service does not constitute an excused absence

Homework:

Your best preparation for the exams is thoughtful, diligent effort on the homework problems.

Unless indicated otherwise, the homework assignments made during the week are due at the beginning of the first class meeting of the following week. No late homework assignments will be accepted.

The following standards for your homework assignments should be followed for minimum credit:
1. Work must be prepared on engineering paper. Please use pencil to avoid crossing out mistakes. Work that is printed from a computer may be on standard printer paper.
2. Staple the pages for the complete assignment together.
3. The complete solution to each problem must be neat and legible. Homework that cannot be deciphered will receive a grade of zero.
4. Each page should include a heading with name, course number, due date and assignment number.
5. Use consistent units and state them clearly.
6. Organization of problem solution:
   • Problem: Clearly write problem number or statement.
   • Given: State known facts about the problem.
   • Find: State what you intend to find. Be clear and concise.
   • Solution: Present the solution in a stepwise logical fashion. Add comments for clarity and clearly list all assumptions. Include appropriate diagrams and figures with pertinent dimensions, etc. Clearly indicate the answer with units.
7. Use a straight-edge to draw straight lines in your figures.

A homework problem that has obviously been copied directly from a solutions manual will receive a grade of zero.
Exams:
Two major exams will be given during the semester. They will occur during our regular meeting time and will be closed book and notes. A suitable formula sheet will be provided with each exam. This formula sheet will be posted in advance on the course website in order for you to view before the exam. The exams are weighted such that the exam which you perform better on is given a higher percentage of your final grade. The exam dates in the schedule defined herein are tentative. If the exam date is going to change, you will be given at least one week’s notice.

Re-Grading Policy:
- Great care is taken to ensure that your assignments and exams are graded correctly, fairly and consistently. However, there may be instances when a mistake has been made in grading your work. If you feel that there has been a mistake, you must submit the work for re-grading within one week after it has been returned to you. Any work submitted after this one-week period will not be re-graded. This policy includes major exams.
- When you resubmit the work for re-grade, you must attach a written formal statement indicating where you feel you lost extra points. You must then sign this statement. The entire problem is then open for a re-grade, and you may end up with a higher or lower score than before. If the issue is just a question of adding up the points incorrectly, you still must attach a written statement to that effect, but no re-grading of individual problems will occur.
- Discussions about points will not be conducted in person. However, I will be happy to discuss the material and concepts covered in the problem with you during office hours.

Final Exam:
The final exam will be closed book and notes, with the appropriate formula sheet provided. The exam will be comprehensive and administered according to the official schedule of final exams.

Scholastic Dishonesty:  http://www.tamu.edu/aggiehonor/

“An Aggie does not lie, cheat, or steal or tolerate those who do.”

Upon accepting admission to Texas A&M University, a student immediately assumes a commitment to uphold the Honor Code, to accept responsibility for learning, and to follow the philosophy and rules of the Honor System. Students will be required to state their commitment on examinations, research papers, and other academic work. Ignorance of the rules does not exclude any member of the TAMU community from the requirements or the processes of the Honor System. For additional information please visit: http://www.tamu.edu/aggiehonor/

Students are expected to understand and abide by the Aggie Honor Code presented on the web at: http://www.tamu.edu/aggiehonor  No form of scholastic misconduct will be tolerated. Academic misconduct includes cheating, fabrication, falsification, multiple submissions, plagiarism, complicity, etc. These are more fully defined in the above web site. Violations will be handled in accordance with the Aggie Honor System Process described on the web site.

The handouts used in this course are copyrighted. By “handouts,” I mean all materials generated for this class, which include but at not limited to syllabi, notes, quizzes, exams, in-class materials, review sheets, and additional problem sets. Because these materials are copyrighted, you do not have the right to copy the handouts unless I expressly grant permission.

Cheating on quizzes and exams will not be tolerated. Cheating will be reported and handled in accordance with the Aggie Honor System Process. Some or all examinations will be closed book; “looking at another student’s examination or using external aids (for example, books, notes, calculators, conversation with others, or electronic devices)” during these examinations is a violation of Texas A&M Aggie Honor Code, Cheating, unless specifically allowed in advance by the instructor.
Unless specifically allowed in advance by the instructor, all assignments and homework in this class are expected to be completed based on individual effort. Copying the work of others, including homework, is a violation of Texas A&M Aggie Honor Code, Cheating.

ADA (Americans with Disabilities Act):
The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Department of Student Life, Services for Students with Disabilities, in Cain Hall or call 845-1637.

General Topics Covered in this Course:

- Introduction to mathematical models of structures
- Static determinacy and stability
- Statically determinate trusses
  - Method of Joints
  - Method of Sections
- Statically determinate beams and frames
  - Internal forces
  - Shear and moment diagrams
  - Superposition
  - Sketching deflected shapes
- Deflections
  - Geometric methods
  - Energy methods
- Analysis of indeterminate structures
  - Approximate methods of analysis
  - Flexibility method
  - Slope-deflection method
  - Moment-distribution method
- Influence lines for determinate and indeterminate structures
- Loads on structures